DEALING DEATH WITH HERTZIAN RAYS

POSSIBILITIES IN WAR OF THE LATEST DISCOVERY BY DOCTOR LE BON

By A. Frederick Collins.

INVISIBLE electric waves by which wireless telegraphy is accomplished may become in the future a noiseless cannon possessing many times the destructive properties to men and ships of the most powerful piece of ordnance now manufactured.

Instantaneous annihilation of the enemy without cannon, powder, shot or shell, but by electricity generated at a distance and transmitted without wires, is the plan of Dr. Le Bon, the noted Parisian scientist.

Thus from a simple laboratory experiment made fifteen years ago by a brilliant German physicist the recent magnificent achievements in wireless telegraphy are directly due, and as a natural sequence in the line of evolution a new engine of destruction employing waves of the same nature may be looked for in the next international war.

Dr. Le Bon, the well known French authority on electricity, and to whom the suggestion for the annihilation of men-of-war at a distance is due, formulated the plan on the following principles:—In investigating phenomena of electric resonance which will be described the savant obtained an effect which, although not new, was none the less startling.

On sending out electric or Hertzian waves from an apparatus termed an oscillator he found himself suddenly surrounded by a brilliant display of electrical fire caused by sparks issuing forth from every metal object in his laboratory. It required no stretch of the imagination to conceive that if powerful electric waves were generated and propagated through space they could be projected in any desired direction by reflection, employing for the purpose large parabolic metal mirrors of suitable construction.

Sending Lightning Bolts.

Electric waves such as are generated at Poldhu, Cornwall, and South Wellfleet, Mass., by Marconi's transatlantic cableless stations could be sent forth from a battleship, and these would produce electrical effects on board the enemy's ships, causing them to bristle with disruptive discharges like miniature strokes of lightning, which would ignite and explode shells and other combustible materials, and all this though the vessels are several miles apart.

The experiment with the oscillator referred to was accomplished by means of an apparatus similar to a transmitter employed in wireless telegraphy, but without the aerial or ground wires which are a characteristic of the usual wireless system.

Le Bon's apparatus was an almost exact duplicate of that designed by the late lamented Heinrich Hertz, who was the first to demonstrate the presence of the invisible electric waves and who first showed how they could be produced and the method for detecting them.

This apparatus comprises an induction coil, the purpose of which is to transform a current of low voltage or potential, as, for instance, a 110 volt current into one of exceedingly high potential, say 100,000 volts. The purpose of this coil is to charge the oscillator with equal quantities of positive and negative electricity.

Now an oscillator to one not versed in the technique of Hertzian waves is about as vague as any piece of electrical apparatus could well be, but after being initiated into the details of construction its exceeding simplicity is at once apparent. It is formed of two brass balls, separated a quarter of an inch, as shown in the illustration; to each of the balls is attached a heavy piece of wire, and these usually end in pieces of zinc or copper.

The wires leading from the induction coil are connected to the arms of the oscillator, as either side of it is termed, the coil charging one with positive and the other with negative electricity simultaneously, until they can carry no more, when the plus and minus charges rush together through the air gap, thus producing a spark.

Simple Matter of a Spark.

It is this simple matter of a spark upon which the making and sending out of the waves depends. The sparks act like a straight steel spring vibrating in air. The process of converting the electrical energy that charges the oscillator into a new form of energy that leaves it as waves, like a soap bubble may be thrown off from a pipe, may be likened to a spring suddenly released when it vibrates to and fro, expending its pent up energy in emitting sound waves in the air.

When the spark takes place in the air gap between the oscillator balls the electric charge surges through the oscillator from one arm to the other like the movements of a spring, but instead of sending out sound waves in and by the air it sends out electric waves, formed in and by the ether.

It was Michael Faraday, that prince of experimentalists, who conceived the idea some sixty years ago that there was such a thing as invisible electric waves, since, he reasoned, that as light waves were visible electric waves, then it was very likely that there were waves of the same nature that the eye could not perceive; but this was purely in the realm of philosophy—it was merely a supposition based upon acute observations.

James Clerk-Maxwell, the great mathematician, convinced that Faraday's supposition was capable of hypothetical deduction, evolved its principles mathematically about twenty years later, but it remained for Hertz, in 1888, to prove the thing experimentally by actually producing the waves, and the Faraday-Maxwell conceptions assumed the importance of something more than theory.

But the electric waves of Hertz—since called Hertzian waves—were quite harmless, for the amount of energy required to produce them was indeed small compared to that required to transmit a wireless message a hundred miles. Since the electric, or Hertzian, waves were invisible, it was indeed difficult to detect them, so Hertz invented a resonator by which he was enabled to see their effects.

This resonator, like the oscillator, has a high sounding name, but since Hertz so called them we may be sure they are scientifically correct and that these terms express the apparatus fully. As a matter of fact, the resonator is even simpler in construction than the oscillator, for it is merely a bit of copper wire bent into the form of a circle, and, the convolution having been cut, a small, sometimes a microscopic, air gap is made in it, as shown in the illustration.

The Wire Circlet.

Now, when the oscillator sends out the electric waves and these impinge on the circlet of wire, or resonator, the ether waves are converted into electric currents in the wire circle, and, jumping across the air gap, a minute spark results. Hertz found, too, that if a resonator was especially proportioned to correspond with the size of the oscillator the spark in the wire circlet would be much larger and considerably brighter.

This was due to a phenomenon electricians term resonance. Electric resonance may be illustrated by the analogue of acoustic resonance. If two tuning forks of the same size, tone and pitch are placed near each other and one of them is struck sound waves are sent out, and these coming in contact with the prongs of the second fork, the latter will respond by emitting the same note and together a louder sound will be produced than either fork is capable of giving alone. This is termed sympathetic acoustic resonance. It is on this principle that by singing a note into a tumbler the period of vibration of which is exactly equal to the frequency of vibration of the note the tumbler will be broken by the voice.

If an oscillator and a resonator are made having the same dimensions electrically when a current surges through the oscillator ether waves are set up, and these impinging on the resonator, similar electric currents take place in it as those in the oscillator. The instruments are then said to be in tune. This is the meaning of electric resonance.

Again, in the technology of the electrician there is that which is termed simple electric resonance. When an alternating or oscillating current is made to surge in a circuit exactly adapted to its frequency the amplitude of the current grows greater and greater, until its energy is exhausted either by heat or electric waves.

In nature there is no such thing as pure resonance, for if there was a current of electricity might begin to amplify by simple resonance until it would destroy the circuit in which it was produced. In Le Bon's experiment this resonance effect was the result of having an oscillator sending out waves of different lengths until every metallic object in the room was charged with electricity, which, being reinforced by the waves from the oscillator, surged through its circuit, and, amplifying not only itself but the cumulative effect of the waves, charged the metal objects to their maximum capacity, when they discharged to the nearest object of the opposite sign.

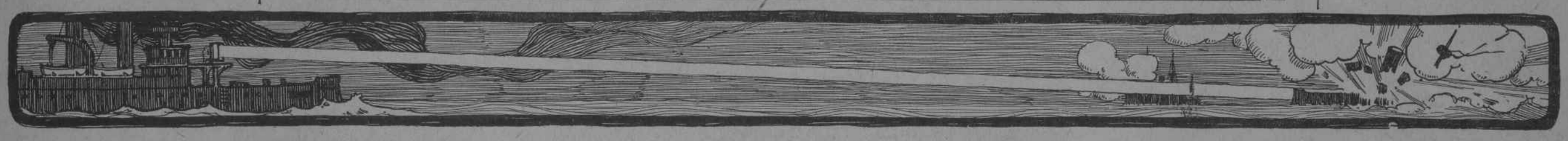
Lodge's Demonstration.

Another demonstration of electrical resonance similar to Le Bon's experiment was made several years ago, when Sir Oliver Lodge gave a lecture before the Royal Society. Along the walls of the auditorium he had arranged some strips of gold leaf. Whenever the oscillator began emitting waves there was a constant sparking of the different portions of the gold leaf.

In fact, it is difficult to experiment with Hertzian waves without charging some metal body in the room to its sparking capacity. It may seem to the ultra-conservative scientist that the suggestion of Le Bon is a little premature, but the destructiveness of modern ordnance has been reached, it is generally admitted. We now have smokeless battles, and that they will be noiseless in the future cannot be doubted.

Fighting it out with invisible agencies must come unless governments convene peace congresses which are more successful than they have been heretofore and arbitration wins and war on earth ceases forever.

EXPLODING AN ENEMY'S MAGAZINE BY MEANS OF HERTZIAN RAYS



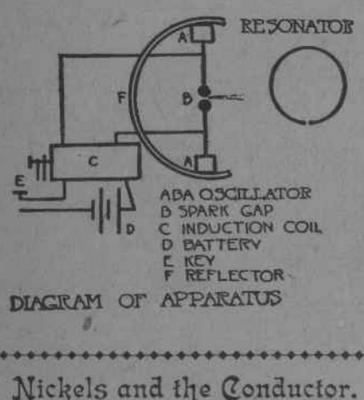


DIAGRAM OF APPARATUS

Nickels and the Conductor.

"EVEN the best of us," said a conductor on the Broadway line yesterday, "sometimes misses a fare in a crowd, but it doesn't often happen, and that is because we have the thing down to a system. On all lines there are certain streets at which we start to go through our car to pick up nickels. Often I am in doubt as to who has not paid a fare, but I don't take chances of wounding any one's feelings by asking for it in that case.

"I meander through the car, stopping now and then before any one I suspect of not having put up his ante. The guilty one usually has pangs of conscience when I place myself before him, and clears up all doubt by beginning to fish through his pockets for the nickel.

"That is one of the tricks and it saves many harsh words, for almost as often as you ask a man who really has settled if his fare has been paid he will bristle up and abuse you. I have learned by experience that it is better to chip in a nickel out of your own pocket than to go around asking for fares when you are in doubt, and most old time conductors will agree with me."

"Does some of the money collected by the conductors fail to get into the coffers of the Metropolitan Traction Company?"

"You mean do conductors steal? Don't hesitate to use plain terms. I'm not thin skinned on that point. In answer I will say that I don't believe that the company loses ten dollars a week through the peculations of its several thousand employes."

Descendants of Manhattan's Indians Drift Back to the City

THE Indians, driven from Manhattan nearly two hundred years ago by white settlers, who bought the entire island from them for a paltry $24, have in the last few years slowly drifted back to the New York of to-day, and now form quite a noteworthy colony of the great city.

Yet few persons are acquainted with the fact that real red men live in the metropolis, and the mere information that such a colony actually exists will be real news to nearly all New Yorkers.

It is not the Indian of the drama nor the Indian of the story book, with his war paint, his flamboyant feather headdress and the shrill whoop and call to battle that is with us now, but in his stead a sober, quiet, "tamed" red man, clothed in the more sombre and less picturesque garb of modern civilization.

He has come to the great city of the White Fathers to fight no foe, to hunt no game, to follow none of the pursuits of the pictured Indian. The white man has taught him that the "almighty dollar" is the most precious game of to-day and that no hunt compares with the hunt for the elusive greenback.

The majority of the red men in New York's Indian colony are engaged in the peaceful occupation of moccasin making or the manufacture of bead work. Some of the Indians make a living from the sale of herb medicines and other special preparations of similar nature. These are known as the "medicine men." Then there are others who at certain times during the year exhibit with travelling shows. Still more secure remunerative employment as models to painters and photographers. These latter find good use for their Indian costumes, garbed in which they appear to most picturesque advantage.

It is not a single tribe of Indians that make their home in the metropolis, but many different tribes—the Iroquois, Abenaki, Sioux, Blackfeet, Mohawk, St. Regis and Arickaree among them. But a racial sympathy exists which unites them all in one community.

Long Feather is one of the most prominent members of the New York colony of Indians. He is a splendid type, tall, broad shouldered and muscular. Magnificently proportioned, he is an ideal model for artists depicting aboriginal life. To all his friends in the Indian colony Long Feather is known simply by his Indian name, but among other acquaintances he is James Long Feather. He is an Iroquois, and lives at No. 281 Hudson street. During the summer months he maintains an Indian village at Rye Beach, where he does a thriving business in all manner of Indian articles, useful, ornamental, or both.

Although Long Feather is by birth an Iroquois, he has the blood of Blackfeet Sioux also in his veins, a fact involving a romance of his ancestry. It seems that many years ago a band of Iroquois in their travels came upon a group of Blackfeet. A battle ensued, in the course of which a favorite Iroquois brave was killed. A boy was captured from the Blackfeet by way of retaliation. This boy was adopted by the Iroquois tribe, and Long Feather is his descendant in the fourth generation.

Long Feather is much interested in the affairs of Indians on the government reservations and in the relations of the government with the Indians. He is unusually intelligent and speaks English very well. He is married, and, being domestic in nature, lives very happily with his charming wife, who is also an Indian. Mrs. Long Feather's Indian name is Frozen Water. She, too, frequently poses as a model. In Indian costume Frozen Water is a splendid type of the young squaw, but in the fashionable American garb of to-day no one would suspect that she was a full blooded Indian. She is fond of dress and has much taste and excellent judgment in the selection of her costumes.

When the Long Feathers are not posing for artists they employ themselves at their home making moccasins and doing beadwork. They have for an assistant a bright Indian girl with equally as frigid an Indian name as Mrs. Long Feather's—Falling Ice. In nothing save her countenance does Falling Ice resemble the Indian. She wears the unromantic costume, skirt and shirt waist of the modern working girl, and—she wears a pair of spectacles!

Clear Water, an aged Mohawk, who claims to be a princess of her tribe, lives at No. 423 West Broadway, with her son, White Moon, a medicine man. White Moon has adopted for a "civilized name," as he calls it, Lewis Smith, and as such he is known to many unacquainted with the fact that he is an Indian.

Mrs. Sallor, who lives at No. 23 Watt street, is also a Mohawk. She makes costumes for members of lodges in the Order of Red Men.

So-San, who is also known as Mrs. Dibeaux, is a full fledged St. Regis Indian, whose employment is principally the making of moccasins and beadwork. She lives at No. 46 Thompson street.

There is a very interesting Indian family living at No. 246 West Twenty-sixth street—the Dark Clouds, or Tahamonts. They are Abenakis, from the northern part of Maine. Dark Cloud, the head of the household, is professionally a model. He is a superb specimen of Indian manhood. He is very well educated, speaks English fluently and has a truly Chesterfieldian charm of manner and speech. Mrs. Tahamont's Indian name is Soaring Dove. She has most striking Indian features. There are two daughters, Beulah Tahamont, a very pretty young woman of eighteen years, whose Indian name is Prairie Flower, and little Bessie, Bright Eyes. Little Bright Eyes attends a public school and is a general favorite with teachers and fellow pupils. She is nine. Both girls have been very carefully brought up and are very refined and charming young folk.

Ah-wa-ne-da, or Sparkling Spring, is a resident of Brooklyn. She is a pretty young woman, and is perhaps familiar to those who visited the last Sportsman's Show. She lives at No. 498 Myrtle avenue and is an intimate friend of the Dark Clouds.